

GENERALIZED EFFECTS OF A PEER-DELIVERED FIRST AID PROGRAM FOR STUDENTS WITH MODERATE INTELLECTUAL DISABILITIES

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Peers with mild intellectual disabilities taught first aid skills to 4 students with moderate intellectual disabilities. A multiple probe design across participants was used to examine the effects of the peer teaching program during an acquisition and a partial sequential withdrawal phase. Generalization assessments were conducted in the participants' homes using novel, randomized simulated injuries. Results suggested that the peer teaching program resulted in acquisition of first aid skills, and the participants' skills generalized to the home, to novel simulated-injury locations, and to new trainers. Additionally, a more detailed analysis of the generalized responding suggested that when given a choice among first aid materials, participants treated burns using large adhesive bandages rather than the materials used in training. Participants also successfully treated injuries when novel instructional cues were used. The findings are discussed with respect to training issues, generalization and maintenance of the acquired skills, and the use of peer tutors with disabilities.

DESCRIPTORS: first aid, generalized responding, error analysis, injury treatment, peer tutors, maintenance, simulation

First aid training is an important community survival skill (Collins, Wolery, & Gast, 1991) necessary for persons with disabilities to live independently. Foege (1988) reported that "injury is the principal public health problem in America today; . . . it will touch one of every three Americans this year" (p. 1). One person in 11 incurred a home injury requiring medical attention or resulting in one half-day or more of restricted activity (National Safety Council, 1988). One percent of the population suffers burn injuries each year (Tarnowski, Rasnake, & Drabman, 1987).

This research was directed by Nancy E. Marchand-Martella in partial fulfillment of the requirements for a PhD in Behavior Analysis in Special Education at Utah State University. The authors gratefully acknowledge Pat Barton at Summit Elementary School for allowing us to conduct this project in her classroom, and Ann and Brant Christensen for serving as data collectors. Additionally, we thank Benjamin Lignugaris/Kraft for his suggestion on the use of novel instructional cues and the Journal Breeding Group at Utah State University for their editorial comments on an earlier version of this manuscript. This project was supported by a student-initiated grant from the U.S. Department of Education, Office of Special Education and Rehabilitative Services.

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First aid studies that used individuals with or without disabilities (e.g., Marchand-Martella & Martella, 1990; Peterson, 1984; Spooner, Stem, & Test, 1989) have not included an analysis of generalized responding if generalization was assessed. Stokes and Osnes (1988) indicated that this information is essential to the development of mature technologies that are effective in community settings.

Several aspects of the first aid literature regarding generalized responding are in need of study. First, most first aid investigations (e.g., Marchand-Martella & Martella, 1990; Peterson, 1984) included a limited number of injury locations during training (e.g., hands) without assessing the participants' ability to treat injuries on novel body locations. These assessments are critical because one often incurs injuries on a variety of body locations that require different treatment procedures (e.g., bandaging an injured finger compared to an injured knee). Second, most first aid investigations did not include assessments of the participants' ability to treat injuries in their own homes. For example, Spooner et al. (1989) and Marchand-Martella, Martella, Agran, and Young (1991) included first

Table 1
Participant and Peer Tutor Characteristics

Partici- pant/Peer tutor	Age	Gender	Test and scores	Additional information
Allen	7	M	Leiter = 59; Slosson Intelligence Test = 48	Visual impairment due to congenital glaucoma; limited receptive (3.25 years) and expressive (2.5 years) language skills as indicated on the Preschool Language Scale.
Carrie	9	F	Vineland = 53; Stan- ford Binet = 44	Difficulties in language as indicated by Goldman-Fristoe Test of Articulation; medication taken including Depakote®, 125 mg (3/day) and phenobarbital, 30 mg (2/day); medication did not affect alertness.
Melissa	11	F	Vineland = 62; Lei- ter = 52	Delayed expressive and receptive language skills (e.g., echolalic speech) as indicated on the Expressive One-word Picture Vocabulary Test (functioned at 3.5 years).
Lance	11	M	Vineland = 57; Lei- ter = 42	Limited receptive language skills (3.2 years) as indicated on Test for Auditory Comprehension of Language-Revised; nonverbal with limited signing; aggressive, destructive, and noncompliant behaviors.
Steve	8	M	Vineland = 61; Lei- ter = 82	Assigned to work with Carrie and Lance; no previous peer tutor training; mainstreamed part of the school day.
Amy	10	F	Vineland = 70; Kauf- man Assessment Battery = 71	Assigned to work with Allen and Melissa; no previous peer tutor training; mainstreamed part of the school day.

aid assessments only in public school settings. In-home assessments are necessary because children are more likely to be injured at home (National Safety Council, 1988). Third, in the first aid investigations that involved the treatment of three injuries (i.e., Marchand-Martella & Martella, 1990; Marchand-Martella *et al.*, 1991; Marchand-Martella, Martella, Christensen, Agran, & Young, *in press*), none assessed the treatment of injuries using instructional cues that were different from those used in training. Because it is unlikely that an individual will always receive the same instructional cues when injured, it is important to assess whether or not participants can discriminate among injuries when a descriptor such as "burned" or "cut" is missing. Fourth, no previous first aid investigations have included error analyses. These analyses provide important information on which injuries and steps in treating those injuries produce difficulties. Finally, no previous first aid investigations have included measures of functionally equivalent treatment methods. Given that participants may have access to a variety of first aid materials, it is im-

portant to assess whether participants use certain materials (e.g., adhesive bandage) more than others (e.g., sterile pad, gauze, or tape).

This study investigated the effects of a first aid training program delivered by elementary-aged peer tutors with mild disabilities to students in the same grade with moderate disabilities. Students' acquisition of three first aid skills (treating abrasions, second-degree burns, and severe cuts) and generalization of these skills to their homes were assessed. In addition, the students' generalized responding was analyzed to determine patterns of errors, use of functionally equivalent procedures, and differences between treating themselves and others.

METHOD

Participants and Peer Tutors

Four students with moderate intellectual disabilities enrolled in a self-contained classroom in a regular public school were participants in this study. None had previously received first aid training. Two

students with mild intellectual disabilities served as peer tutors. Each peer tutor taught 2 participants. Table 1 displays the characteristics of the participants and the peer tutors.

Settings

All baseline and training sessions were conducted in a kitchen area of a building near the public school. This kitchen area contained a sink, refrigerator, stove, counter, and two chairs. All generalization assessments were conducted in the kitchen or bathroom of the participants' homes, depending on where the parents most often treated injuries and where they kept the first aid kit provided by project staff.

Materials

Simulated injuries. The simulated injuries used for training were manufactured by Simulaids. (Simulated injuries can be purchased from Simulaids, Inc., P.O. Box 807/Dixon Avenue, Woodstock, New York 12498.) Two-way tape was used to attach the simulated injuries to the skin. Simulated blood was used on severe cuts, dirt was placed on abrasions, and embalmer's wax was applied to burns to simulate blisters.

Abrasions were defined as a scraping of cell tissue from the outer layers of the body that produces limited bleeding (American National Red Cross, 1988). Second-degree burns were defined as a redness of the skin, blisters with swelling, and a wet appearance as a result of the skin touching something hot (American National Red Cross, 1988). Severe cuts were defined as incised wounds that occur when body tissue is cut by knives, rough edges, broken glass, or other sharp objects; bleeding may be rapid and heavy (American National Red Cross, 1988).

Injury sizes and locations were determined by asking a first aid instructor to identify the most common sizes and locations of actual abrasions, second-degree burns, and severe cuts on children. The instructor reported that abrasions are approximately 5.08 cm, burns are approximately 3.81 cm, and severe cuts are usually 1.27 cm in length

(D. McArthur, Logan Regional Hospital, personal communication, February 1, 1990). Therefore, all simulated injuries were trimmed to fit these measurements. Four locations were identified for abrasions: the left and right elbows and knees. Twenty-six locations were identified for burns and cuts: all fingers (top and bottom, left and right), palm (left and right), hand (top, left and right), and forearm (top, left and right).

First aid kit. The investigators supplied participants with a first aid kit for their homes that consisted of soap, paper tape, 5.08-cm square sterile pads, rolled cling gauze, clean cloth or paper towels, child-safe scissors, and adhesive bandage strips (5.08 cm by 11.43 cm). These materials were contained in a plastic box with a handle and with the words "first aid" and a red cross on the lid. These materials were also used in all baseline and training sessions.

Data Collection and Dependent Measure

A trial-based procedure was used to collect data on the participants' treatment of each of the three injuries (abrasions, burns, and cuts) by a trainer (first author) during baseline and training conditions. An observer collected data on the participants' treatment of each of the three injuries during generalization assessments. Treatment of each injury was divided into a sequence of steps based on task analyses adapted from the American National Red Cross (1988). This adaptation involved adding a requirement that the participant tell an adult "I'm hurt" or "I scraped (burned) (cut) myself" either verbally or by signing before, during, or after treating an abrasion or burn and after caring for a severe cut. The correct or incorrect completion or non-completion of each step of the task analyses was recorded. The percentage of each of the three injuries treated accurately was calculated and served as the primary dependent measure. The task analyses for the three injuries are shown in Table 2.

Another adaptation was added to include functionally equivalent alternate responses for the steps of the task analyses for burns and abrasions. These alternate responses were putting a sterile pad, gauze, or tape on an abrasion instead of an adhesive bandage.

Table 2
Task Analyses of First Aid Skills

Abrasions

1. Wash wound under cool running water with soap.
2. Blot dry with sterile gauze or clean dry cloth.
3. Peel off adhesive plastic protectors without touching sterile pad.
 - * Place sterile nonstick pad on injured area.
4. Place bandage pad over wound so that it covers the wound completely.
 - * Wrap with gauze to secure pad.
5. Press adhesive strips so that they adhere to undamaged skin.
 - * Tape gauze to secure pad.
6. Show or tell an adult.

Second Degree Burns

1. Immerse in cold water.
2. Blot dry with sterile gauze or clean dry cloth.
3. Place sterile nonstick pad on burned area.
 - * Peel off adhesive plastic protectors without touching sterile pad.
4. Wrap with gauze to secure pad.
 - * Place bandage pad over wound so that it covers the wound completely.
5. Tape gauze to secure pad.
 - * Press adhesive strips so that they adhere to undamaged skin.
6. Show or tell an adult.

Severe Cuts

1. Cover wound with cloth or sterile gauze pad.
2. Apply pressure to wound.
3. Continue applying pressure and elevate injury above the heart.
4. Continue with Steps 1–3 and show or tell an adult.

* functionally equivalent step.

dage and placing an adhesive bandage on a burn instead of using a sterile pad, gauze, or tape.

Experimental Design

A multiple probe design across 4 participants was used to assess the effects of the intervention (Barlow & Hersen, 1984). The experimental conditions included baseline, training with two phases, and generalization assessments.

Procedure

Pretraining. Both tutors had participated previously in a first aid investigation (Marchand-Martella *et al.*, in press), and had learned to treat abrasions, burns, and cuts on puppets. The peer

tutors were taught to provide instructional cues, to correct errors, and to praise correct completion of steps.

Assessment of novel injuries prior to baseline. This assessment was conducted in the participant's home while the peer tutor was not present. A simulated injury was placed on the participant or his or her sibling, and an observer pointed out the injury and cued the participant to apply first aid (e.g., for abrasions, "You (he) scraped yourself (himself). Show me how to take care of it"). Therefore, each participant was assessed with six simulated injuries (i.e., abrasions, burns, and cuts on self and others). The injury locations were randomly selected from the total number of abrasion, burn, and cut locations. After the session, the participant and his or her sibling were praised for their hard work (i.e., contingent on the absence of noncompliant, aggressive, or disruptive behavior) and were given stickers or small school supplies for participation.

Baseline. A simulated injury was placed on the participant, and the peer tutor pointed out the injury and cued him or her to take care of it (e.g., "You cut yourself. Show me how to take care of it"). The simulated wounds were placed on the back of the participants' hands and were alternated between the left and right hands. The type of injury was counterbalanced across sessions (e.g., abrasions, burns, and cuts for Session 1 were followed by burns, cuts, and abrasions for Session 2 and cuts, abrasions, and burns for Session 3). No modeling or feedback was provided by either the peer tutor or the trainer. Following the session, the participant and tutor were praised for working hard and received praise, stickers, or small school supplies for participation.

Assessment of novel injuries after baseline. All conditions remained the same as in the assessment prior to baseline.

Peer instruction. Peer instruction of participants consisted of three components—modeling, participant practice with corrective feedback and praise, and a retest. First, the tutor told the participant that he or she was injured and was going to take care of it (e.g., "I scraped myself. I will show you

how to take care of it"). The peer tutor modeled each treatment step on his or her own injury. Next, the tutor provided the instructional care (e.g., "You scraped yourself. Show me how to take care of it") and the participant practiced the skill with his or her own injury. The tutor provided corrective feedback for incorrect responses and praised correct responses. Finally, the participant practiced again without tutor feedback (retest). The three-component procedure was repeated each session for all three injuries. Again, the simulated wounds were placed on the back of the participant's hands and were alternated between the left and right hands. Criterion for completing this phase of training was completion of 100% of the steps correctly for each of the three injuries for three consecutive sessions.

Feedback only. This phase of training included the removal of two training components (i.e., modeling and participant practice) from the intervention. Thus, the tutor cued the participant to respond and, after the participant had treated the injury, provided corrective feedback or praised correct responses. This procedure was repeated each session for all three injuries. Criterion for completing this phase of training was completion of 100% of the steps correctly for each of the three injuries for three consecutive sessions.

Assessment of novel injuries after feedback only. All conditions remained the same as in the previous two assessments.

Booster training and school assessment. Each participant who did not complete 100% of the steps correctly for each injury during the assessment following the feedback-only phase was given additional training tailored to the injuries for which errors occurred. Training consisted of practice with feedback followed by a retest as previously conducted in the peer instruction phase. Peer modeling was not conducted. After the participant reached 100% correct performance for three retests in booster training, a school assessment was conducted.

During the school assessment, an observer assessed the participant's response to the injuries practiced in booster training. If 100% performance was not achieved, booster training was reinstated followed by an additional school assessment. No feed-

back was given during these school assessments. However, the participant was praised for working hard and received a small reward for participation.

Assessment of novel injuries after booster training and school assessment. After completing 100% of the steps correctly for the injuries in the school assessment, each participant treated six novel injuries at home. After completing this assessment, booster training was provided if the participant achieved less than 100% correct on any injury treatment.

Assessment of novel injuries (1, 2, and 3 months) and novel instructional cue assessment (3 months). All conditions remained the same as those described in the assessment following booster training and school assessment. However, before the 3-month assessment, an assessment with novel instructional cues was conducted. In this assessment, participants were asked to treat six injuries on themselves and others when novel instructional cues were delivered (for abrasions, "You (he) fell down and look what happened. Show me how to take care of it"; for burns, "You (she) touched a hot pan and look what happened. Show me how to take care of it"; and for cuts, "You (he) were slicing vegetables with a knife and look what happened. Show me how to take care of it"). Two participants, Melissa and Lance, did not receive rewarding or corrective feedback on their performance before, during, or after the novel instructional cue assessment. However, the observer mistakenly conducted booster training with Allen and Carrie after the six injuries were treated.

After the novel instructional cue assessment and before the 3-month assessment, parents were taught how to treat each injury by an additional observer who modeled and explained treatment procedures and demonstrated appropriate and inappropriate procedures. After the parents reached 100% agreement with this observer, they were asked to take data during the 3-month assessment.

Generalized Responding

An error analysis of the generalization assessments following the feedback-only phase was conducted to determine patterns of errors for treating

abrasions, burns, and cuts. An error was scored for any step missed or performed incorrectly. In addition, a comparison of treatments for each injury on self versus others and the use of functionally equivalent procedures were examined (see Results).

Interobserver Agreement

Two observers received training in first aid skills that included demonstrations and explanations of appropriate and inappropriate skill performance for each injury and practice recording. One observer served as the secondary observer for all baseline and training sessions and as the primary observer for all generalization assessments (including the novel instructional cue assessment) in the parents' homes and the assessments after booster training conducted in the school. The trainer (senior author) served as the primary observer for training and booster training. The second observer conducted the generalization assessments in the parents' homes and in the school. This observer also trained the parents.

Interobserver agreement was calculated for occurrence, nonoccurrence, and total agreement by dividing agreements for each step of the task analyses by agreements plus disagreements and multiplying by 100. Interobserver agreement was calculated on 41% of baseline sessions, 20% of peer instruction and feedback-only sessions, 17% of school assessments, and 82% of generalization assessments.

Agreement was examined separately for baseline, peer instruction, and feedback-only conditions, school assessments, and generalization assessments. The average for occurrence, nonoccurrence, and total interobserver agreement for treatment of injuries for all conditions was 98.3% (range, 67.7% to 100%), 97.9% (range, 83.3% to 100%), and 98.9% (range, 83.3% to 100%), respectively. Interobserver agreement during the 3-month assessment averaged 100% between the first and second observers and 100% between the first observer and parents. Agreement was not taken during the novel instructional cue assessment because the second observer was training the parents at this time.

RESULTS

Assessment of Novel Injuries Prior to, During, and After Baseline

Figures 1 and 2 display the percentages of steps completed correctly for treating injuries by Allen, Carrie, Melissa, and Lance. Prior to baseline, none of the participants performed any of the steps correctly for treating abrasions, burns, and cuts. During baseline, participants completed 25% or less of the steps for cuts and 16.7% or less of the steps for abrasions and burns. During the assessment after baseline, Allen, Melissa, and Lance again failed to complete any of the steps correctly, whereas Carrie completed one step correctly when caring for an abrasion on others.

Peer Instruction and Feedback Only

During the peer instruction phase, participants quickly acquired the three first aid skills. Participants completed more steps correctly when treating cuts than when treating abrasions or burns. During the feedback-only phase, participant scores across injury treatments were all above 66.7%.

Assessment of Novel Injuries After Feedback Only

Participants completed 100% of the steps correctly for at least one injury (Allen, one; Carrie, five; Melissa, two; Lance, three) at their homes.

Booster Training and School Assessment

During the first school assessment, Carrie and Lance completed 100% of the steps correctly for the injuries in which they had received booster training. Because Allen and Melissa scored less than 100% during the first school assessment, additional booster training was conducted, followed by a second school assessment. Allen and Melissa performed 100% of the steps correctly on the second school assessment.

Assessment of Novel Injuries After Booster Training and School Assessment

Lance achieved 100% correct on treating all injuries; Allen, Carrie, and Melissa scored less than

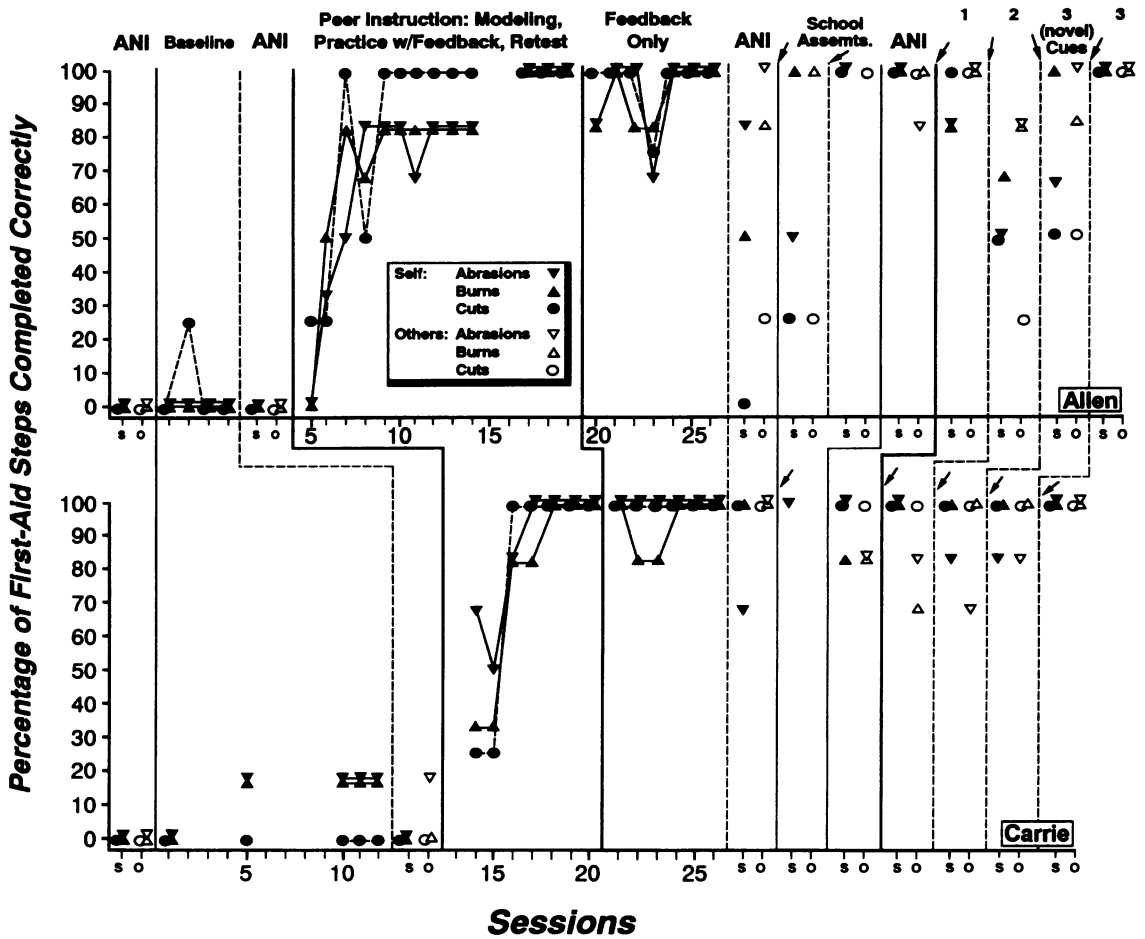


Figure 1. Percentage correct for treating abrasions, burns, and cuts for Allen and Carrie. Arrows indicate when booster training occurred. ANI = assessment of novel injuries. The numbers above the last four phases refer to the 1-, 2-, and 3-month assessments of novel injuries and the 3-month assessment of novel instructional cues.

100% on one or more injuries and, therefore, required booster training.

Assessment of Novel Injuries (1, 2, and 3 Months) and Novel Instructional Cue Assessment

After the 1-month assessment, Lance required booster training on only one injury. Carrie and Allen required booster training on two injuries, and Melissa required booster training on three injuries. After the 2-month assessment, Lance did not require booster training, Carrie required booster training on two injuries, Melissa required booster training on three injuries, and Allen required booster training on all six injuries. Finally, after the 3-month

assessment, none of the participants required booster training.

For the novel instructional cue assessment, Melissa and Lance completed 100% of the steps correctly for all six injuries; Carrie completed at least 83.3% of the steps correctly; Allen completed at least 50% of steps correctly for all injuries.

Generalized Responding

Analyses of generalized responding were conducted for the following in-home assessments (i.e., after the feedback-only phase, after the booster training and school assessment, and 1, 2, and 3 months after booster training and school assessments).

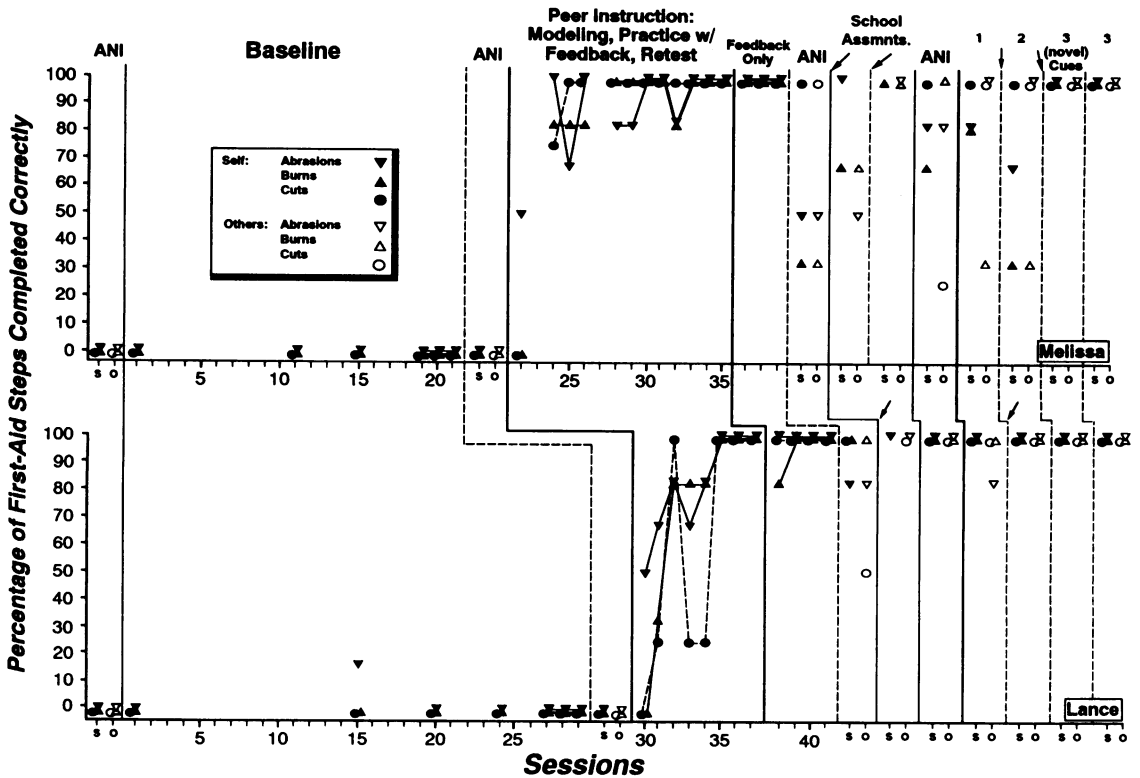


Figure 2. Percentage correct for treating abrasions, burns, and cuts for Melissa and Lance. Arrows indicate when booster training occurred. ANI = assessment of novel injuries. The numbers above the last four phases refer to the 1-, 2-, and 3-month assessments of novel injuries and the 3-month assessment of novel instructional cues.

Error analysis. The errors noted for each participant on each step of the task analyses are presented in Table 3. For abrasions on knees and elbows, 28 errors occurred. Step 1 (washing the injury) produced the most frequent errors (11). Eight of these 11 errors were due to using water without soap (Carrie and Melissa) and three were due to the failure to use soap and water (Allen). Ten of these 11 errors occurred when taking care of abrasions on knees. The second most frequently occurring error was Step 4 (placing bandage over wound, wrap with gauze to secure pad), for which seven errors were noted. Again, more errors occurred on knee injuries than on elbow injuries (five of the seven errors). All of these errors occurred because the bandage pad did not cover the wound completely and occurred when participants treated knee injuries on themselves.

There were 35 errors for burns on the palm, forearm, and fingers. Step 5 (taping the gauze, press

adhesive strips of bandage) was performed incorrectly nine times. These errors were due to the participants' failure to put on a sterile pad, which led to a failure to secure the pad with tape or to press down adhesive parts of bandage so as to adhere the bandage to the undamaged skin around the wound. Steps 1 (immerse in cold water), 2 (blot dry), and 4 (wrap with gauze, place bandage pad over wound) were completed incorrectly seven times each. These errors were due to the use of soap (Step 1), failure to blot dry (Step 2), and failure to secure sterile pad with gauze or to cover wound completely with adhesive bandage (Step 4).

Treating cuts on the forearms and fingers resulted in 17 errors. Most errors occurred on Steps 3 (continue with pressure and elevate above heart) and 4 (continue with Steps 1 through 3 and show an adult), with six errors for each step. These errors occurred most often because the participants failed to elevate and apply pressure at the same time.

Treating injuries on self versus others. For abrasions on self and others, the participants averaged 86.7% (104 of 120) and 90% correct (108 of 120), respectively. For burns on self, the participants averaged 85% correct (102 of 120); for burns on others, the participants averaged 86.7% correct (104 of 120). Finally, for cuts on self, the average was 92.5% correct (74 of 80) versus 88.8% correct (71 of 80) for cuts on others.

Functionally equivalent procedures. For abrasions, the original training procedure was used 38 out of 40 times (95%). Of these 38 procedures, 23 were completed correctly (60.5%). Functionally equivalent procedures were used two out of 40 times (5%) with one completed correctly (50%). For burns, the original procedure was used 13 out of 40 times (32.5%). Of these 13 procedures, six were completed correctly (46.2%). Functionally equivalent procedures were used 27 out of 40 times (67.5%) for burns, with 19 completed correctly (70.4%).

DISCUSSION

Four elementary-aged students with moderate disabilities learned to treat abrasions, burns, and severe cuts in a training program implemented by peer tutors with mild disabilities. The participants acquired these skills in a relatively short period of time; more importantly, the newly learned skills generalized across settings, trainers, and injury locations. After learning to treat abrasions, burns, and cuts on themselves (back of hands), the participants required little or no additional training to treat injuries on novel body locations on themselves or others. This generalized skill is important in first aid because a variety of injuries may occur on numerous body locations, and children may frequently be in a position to help an injured friend or sibling. One parent (Allen's mother) collected data on the percentage of steps completed correctly by her son when he treated his knee after falling off his bicycle. Allen completed 100% of the steps correctly and independently. This finding is consistent with generalization data reported by Marchand-Martella and Martella (1990) and Spooner et al. (1989).

Assessing maintenance of performance is critical

Table 3
Number of Errors per Step for Each Participant during
In-Home Assessments of Novel Injuries
Following the Feedback-Only Phase

Task analyses (Steps)	Participants				Total
	Allen	Carrie	Melissa	Lance	
Abrasions					
1	3	4	4	0	11
2	1	0	0	1	2
3	1	0	0	0	1
4	1	2	3	1	7
5	0	1	4	0	5
6	1	0	0	1	2
Total	7	7	11	3	28
Burns					
1	0	0	7	0	7
2	3	1	3	0	7
3	1	0	3	0	4
4	1	1	5	0	7
5	2	2	5	0	9
6	1	0	0	0	1
Total	8	4	23	0	35
Cuts					
1	1	0	0	0	1
2	3	0	1	0	4
3	4	0	1	1	6
4	4	0	1	1	6
Total	12	0	3	2	17

for skills not practiced regularly (Horner, Williams, & Knobbe, 1985). During training, participants in this study practiced first aid treatments daily; however, during maintenance, when participants practiced treatment of injuries once per month, performance deteriorated somewhat. Therefore, it seems that at least for these individuals, frequent opportunities to practice first aid skills are essential. Spooner et al. (1989) indicated that individuals without disabilities also need to review first aid skills periodically.

Discrimination training may be related to generalization and maintenance of skills (Spooner et al., 1989). In the feedback-only phase, when tutor modeling and practice with feedback were withdrawn, the participants' ability to discriminate among injuries became evident. In this phase, the participants had to care for an injury based on its

physical characteristics rather than on specific instructions (e.g., modeling and feedback) provided by the trainer. To be sure that characteristics of the injury rather than verbal cues were controlling responding, novel cues were used during the 3-month assessment. Results indicated that the participants discriminated among injuries based on appearance, not on the instructional cues used in training. Previous investigations of first aid did not include instructional cues different from those used in training; therefore, participants' ability to select treatment procedures based on the characteristics of the injury was not examined.

The error analyses of the generalization assessment data yielded some interesting findings. First, participants had difficulty washing abrasions on knees with soap and water. This difficulty may have arisen because the participants had been taught to wash injuries under running water in the sink. Therefore, in the generalization assessments, the participants often had to improvise (e.g., Lance washed his knee in the bathtub; Carrie used a wet paper towel with soap on it to wash her knee). Participants also had difficulty putting the bandages on their own knees. They had less difficulty placing an adhesive bandage on someone else's knee. One can stand or sit upright when treating someone else's knee and the injury is in full view. In contrast, treating one's own knee requires some physically awkward positioning.

Another possible explanation for some of the failures to provide appropriate first aid may have been due to differences in settings. For example, the first observer indicated that she almost always had to interrupt the participants when they were engaged in preferred activities at home (e.g., playing outside, playing Nintendo®). By contrast, the trainer almost always interrupted classroom instruction. Therefore, it seemed as though the participants tried to rush through the assessments conducted at home in order to return to playing outside, but were less anxious to return to the classroom.

The findings concerning the participants' use of functionally equivalent procedures were informative. The participants used alternate procedures more often when caring for burns than abrasions. This

probably occurred because it is easier to put an adhesive bandage on an injury than it is to place a sterile pad on an injury, wrap it with gauze, and tape it to secure the pad.

The findings concerning functionally equivalent procedures as well as the error analyses have important implications for training. First, the children were more likely to use adhesive bandages than sterile pad, gauze, and tape and were more successful that way. Adhesive bandages also cost 67% less than sterile pads, gauze, tape, and child-safe scissors. Thus, we suggest adhesive bandages be used in lieu of the other materials in training. Second, participants make more errors treating knees than other injuries because the procedures used in training (running water over the injury in the sink) are often not possible when real injuries occur. Therefore, it seems appropriate to add a training component to teach children what to do when they cannot run the injury under water in the sink.

This investigation also used peers as instructors, which is a new method in the literature on first aid instruction. Although the purpose of the present study was not to demonstrate the effects of peer instruction on the instructors themselves, it should be noted that the first aid skills of the two instructors were maintained at higher mean levels for up to 12 weeks after training compared to the other participants with similar disabilities (i.e., 85.8% vs. 70.2% for abrasions, 88.3% vs. 75.6% for burns, and 92.5% vs. 51.8% for cuts) in the investigation of Marchand-Martella *et al.* (in press). This finding is consistent with the findings of other researchers on the learning benefit of peer instruction (e.g., Parson & Heward, 1979). An important future consideration is an efficiency and cost-benefit analysis for the use of peer instructors.

The findings suggest that first aid treatment generalized across settings and injury locations; however, several caveats are in order. First, participants were not taught to discriminate among injuries requiring immediate outside help and those they could treat themselves. Future programs should teach this discrimination depending on the type, severity, and location of the injury. Second, in this study, booster training prevented atrophy of skills over time. Fu-

ture research is needed to determine the optimal frequency for maintenance assessments and booster training. Third, when injuries were treated following novel instructional cues, feedback was provided to Allen and Carrie. Further, the same injury locations were used in the 3-month assessment, which followed shortly after the novel instructional cue assessment. Therefore, it is not certain that participants would have completed 100% of the steps correctly during the 3-month assessment if they had not received this additional training. Finally, a pretest was not conducted with the novel instructional cues used during the 3-month assessment. Thus, although it seems unlikely, it is possible that participants might have responded to these instructions before intervention.

In summary, this study presents a promising program to teach children with moderate disabilities basic first aid skills that generalize to their homes and to novel injury locations. More important, procedures used in this study appear to promote efficient learning because the participants exhibited generalized responding to novel injuries on different body locations.

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Received June 24, 1991

Initial editorial decision September 4, 1991

Revisions received December 26, 1991; March 12, 1992;
April 27, 1992

Final acceptance June 30, 1992

Action Editor, F. Charles Mace